Does thinning California black oak basal sprouts following severe fires yield ecosystem dividends?

Black oaks need fire to thrive against conifer competition, but severe burns jeopardize the benefits provided by mature oaks. Field studies are examining whether thinning treatments might speed their recovery.

Land managers want to know whether thinning the basal sprouts on top-killed California black oaks following wildfire pays dividends by enhancing growth of the remaining stems. Such treatments may offer a way to more rapidly restore key services that mature oaks provide. We have synthesized published research and have initiated a new field study on the Power Fire, as part of a larger collaboration in with researchers from Humboldt State University in the northern Sierra Nevada.

Key Findings

- High– and moderate-severity fire often kills the above-ground stems of black oak trees,
- Even though the trees typically resprout (Fig. 1), such top-kill results in decades of lost services from acorn production and wildlife habitat.
- Thinning resprouting stems down to one or a few stems has potential to increase growth of remaining stems, based upon local accounts and some limited studies.
- Field studies are underway, including one on the Power Fire, to evaluate the potential benefits of such treatments.

Figure 1: Severe fires commonly kill the stems of mature black oak trees, resulting in many small sprouts at the base of the dead stem.

Figure 2: Oak groves that burned at low severity in the Power Fire remain important habitat for deer and other wildlife species.

For information on restoring black oaks, see Long, J. W.; Anderson, M. K. Quinn-Davidson, L.; Goode, R. W.; Lake, F. K.; Skinner, C. N. 2016. Restoring California black oak ecosystems to promote tribal values and wildlife. Gen. Tech. Rep. PSW GTR-252. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 110 p. https://www.fs.usda.gov/treesearch/pubs/51080

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Project Overview

Introduction

Managers want to know whether thinning the resprouts is effective in accelerating recovery of ecosystem services such as acorn production and wildlife habitat.

Methods

We reviewed the limited research on thinning stems resprouting from the base following top-kill from the Sierra Nevada and from Spain, where such treatment has been used. We gathered field data on effects of the Rim Fire and Power Fire on black oaks. We also designed a field study for the Power Fire as part of a larger collaborative research effort in the Sierra Nevada with researchers from Humboldt State University.

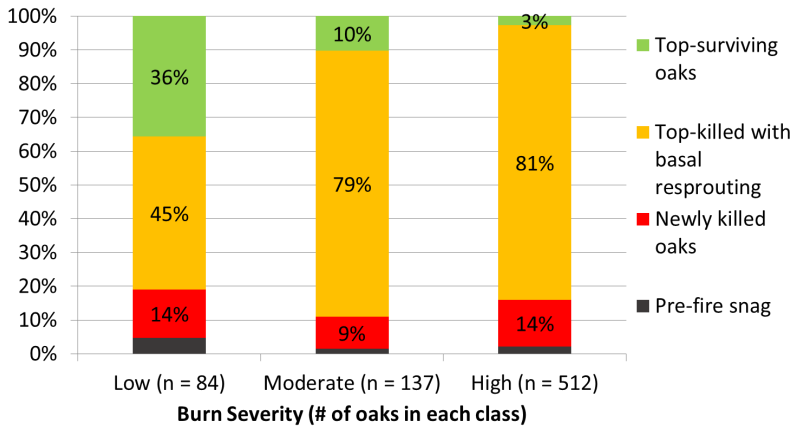

Figure 3:The tops of black oak trees did not survive well in areas mapped at moderate or high severity that were sampled 1 year after the Rim Fire.

Findings to Date

Studies of several fires has shown that the frequency of top-kill increases with burn severity, and relatively few stems survive in high severity patches. Where such patches are particularly large, management interventions to accelerate stem development may be a priority. Although local managers commonly suggest that thinning basal sprouts is effective in accelerating the growth of residual stems, there has been limited study to evaluate its effectiveness in post-fire conditions. Thinned stems can respond by forming new branches, which limits the effectiveness of the treatment, and information about the recovery of untreated oaks is also lacking. Field research will be conducted in 2018, with plans for future monitoring as well.

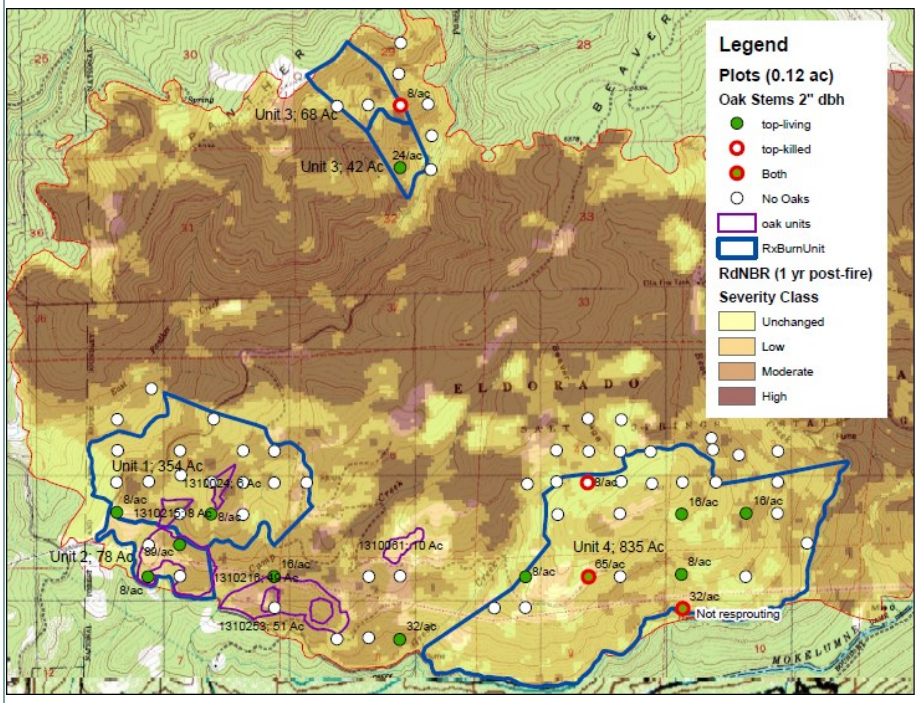

Figure 4: Preliminary study plots in Power Fire, showing location of top-living, top-killed, and fully dead black oaks relative to burn severity.

We lack information on how long it will take for top-killed black oaks to regrow to form large trees and produce acorns, or how trees will respond to thinning treatments. People interested in these treatments for their lands may want to follow or replicate our ongoing study to help answer these questions.

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